Appl. No.: 10/003,574
Amdt. dated 10/20/2005
Reply to Office action of 06/22/2005

REMARKS/ARGUMENTS

Claims 1-6, 8-12, 14, 15, and 26 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Baines, Musow, and Applicants' own admissions on page 5 of the specification.

The Examiner has requested a translation of FI Patent No. 66,662. US Patent No. 4,236,960 and the '662 patent both claim priority to SE 7807910, and include the same disclosures.

In the rejection, the Examiner alleges that the Applicant admits that FI Patent No. 66,662 teaches the measurement of green density and control of white liquor infeed. The Examiner's characterization is incorrect. The discussion of the '662 patent in the present application states that the '662 patent teaches that the causticizing process may be controlled by adjusting the amount of lime that is added to the slaker. The amount of lime may be determined by measuring the carbonate-ion concentration of the green liquor as it enters the slaker and the carbonate-ion concentration of the white liquor as it exits the slaker. From these measurements, the amount of lime to be added to the slaker may be adjusted. The carbonate-ion concentration of the green and white liquors is determined by converting the carbonate to carbon dioxide and thereafter using an analyzer to measure the CO_2 concentration of the green and white liquors. In factory tests the concentration of the green liquor may be monitored by determining the density of the green liquor. However, the '662 patent teaches that the causticizing reaction is controlled by adding lime to the slaker, which is calculated by measuring the carbonate concentration in both the white and green liquors. There is no disclosure or suggestion that the causticizing process can be controlled by adjusting the density of the green liquor. There is also no disclosure or suggestion to control the density of the green liquor by adjusting the amount of white liquor fed into the green liquor.

Musow describes a process wherein the causticization process is controlled by adjusting the amount of weak wash solution that is added to the dissolving tank so that the concentration of sodium carbonate in the green liquor is maintained at a pre-determined level. Musow further teaches that the sodium carbonate concentration is determined by measuring the conductivity of the green liquor. Thus, Musow teaches controlling the causticization process by maintaining the

level of sodium carbonate at a predetermined level, and that the concentration of sodium carbonate may be controlled by adjusting the amount weak wash added to the dissolving tank before the green liquor is even formed.

The claimed invention controls the causticization reaction by adjusting the density of the green liquor being fed into the slaker. This is a completely different process than that which is described in Musow. As stated above, Musow teaches adding weak wash solution to the dissolving tank. In the dissolving tank the material is comprised of melt coming from a recovery boiler. Green liquor quality control, which is based on adjusting the flow of the weak wash into the dissolving tank, is considerably slow and inaccurate because of the delay in the dissolving tank and the high concentrations of impurities (dregs and carbon) that are present in the tank. In sharp contrast, the claimed invention controls the causticization process by adding weak white liquor to the green liquor before the green liquor is fed into the slaker. This is not disclosed or suggested by Musow. Adding weak white liquor to the green liquor requires considerably less solution than the process described in Musow. The invention provides better control and accuracy of the resulting green liquor than the process of Musow.

Musow does not disclose or suggest measuring the total titratable alkali (TTA) and density of the green liquor to be used in combination with a model that correlates green liquor density to the measured TTA so that a desired set-value for the density of the green liquor can be calculated. Musow also does not disclose or suggest adjusting the density of the green liquor to a set-value by adding weak white liquor into the green liquor before it is fed into the slaker.

As discussed above, Musow teaches controlling the causticization reaction by maintaining the concentration of the sodium carbonate at a desired level. Musow does not teach controlling the causticization reaction by controlling the density of the green liquor. At best, Mosow states that the concentration of the sodium carbonate can be determined by density or TTA; however, Musow actually teaches away from such measurements because they are less accurate. See column 2, lines 58-62.

Baines is directed to a method of controlling the causticizing process by controlling the amount of lime that is introduced into the slaker. See column 5, lines 50-51. For example, Baines states that the "introduction of lime, CaO, to the slaker is the critical point of control."

See column 5, lines 48-49. Baines teaches that the amount of lime that is to be added to the Slaker may be determined by measuring concentrations of the primary constituents of the green liquor and the white liquor: carbonate, hydroxide, and sulfide. These components are individually measured to provide the control system with a complete characterization of the reagents participating in the causticizing reaction so that each individual component may be accounted for by the control system. See column 3, lines 9-15. Baines also describes that the control system may monitor ambient measurements, such as pH, flow rate, density of the liquor as it is processed through the slaker, and that these ambient measurements are not critical to the invention. See column 5, lines 55-65. Notably, Baines states that the density of the liquor is measured as it is processed through the slaker. Once in the slaker, the green liquor reacts with lime to undergo causticization reaction and is no longer considered green liquor. Thus, Baines does not disclose or suggest measuring the density of the green liquor, let alone adjusting its density to control the causticizing reaction. In sharp contrast, the claimed invention measures the density of the green liquor before it is fed into the slaker.

Additionally, Baines states that measurement of the relative concentrations of the individual liquor components is critical to the invention, as opposed to a measurement of a characteristic of the total liquor. See column 6, lines 10-13. However, the claimed invention controls the causticizing reaction by measuring the density of the green liquor and measuring the total titratable alkali in the green liquor to calculate the amount of weak white liquor that is to be added to the green liquor. Indeed, Baines actually teaches away from using a measurement such as total total titratable alkali (TTA) because "a measurement of a single characteristic of the entire white or green liquor, as taught by Bertelsen, can result in error...." See column 2, lines 27-29. Thus Baines does not disclose or suggest a process of controlling the causticizing process by measuring the TTA of the green liquor entering the slaker and then using this measurement to calculate a set-value for the density of the green liquor.

The Examiner relies on Baines for the assertion that the step of using a computer to control the causticization reaction is obvious. However, the computer process in Baines is completely different than that of the claimed invention. Baines describes a control system that uses a fuzzy logic controller or a neural network that is "trained" to produce the desired

causticizing control signal for any given set of liquor component measurements input to the neural network. See column 3, lines 41-55. As discussed above, Baines teaches control of the causticization reaction by measuring the individual components of both the green and white liquor and then using this data to determine the amount of lime to feed into the slaker. In sharp contrast, the claimed invention controls the causticization reaction by measuring the TTA and density of the green liquor and then adjusting the density of the green liquor to a set-value by the addition of weak white liquor to the green liquor. The set-value for the density is calculated from a model that relates the measured TTA of the green liquor to the green liquor density, and from a target value for TTA. Baines' computer process does not disclose or suggest these steps. In fact, Baines actually teaches away from such a process for at least the following reasons: 1) Baines teaches that the measurement of a single characteristic, such as TTA, may introduce error; and 2) Baines states that any "rigid mathematical formulation that could be developed to correlate the multiple inputs ...would be prohibitively costly to develop and implement, but would also suffer reduced performance." See column 8, lines 4-8. Baines does not disclose or suggest a process of controlling the causticization process by measuring the density and TTA of the green liquor, or a process that uses such measurements and a model to calculate a set-value for the density of the green liquor.

The Examiner has not established a prima facie case of obviousness for several reasons. First, there is no motivation to combine the references because Baines teaches away from using a single characteristic, such as TTA or density, in controlling the causticization reaction. In contrast, Musow teaches calculating the concentration of a single component to maintain a desired level of sodium carbonate within the green liquor. As stated above, Baines teaches control by measuring the individual components within both the green and white liquor. Thus, Baines teaches away from measuring a single component as disclosed in Musow. Furthermore, both methods describe completely different processes for controlling the causticization reaction. Baines teaches controlling the amount of lime added to the slaker, whereas Musow teaches maintaining the sodium carbonate concentration at a desired concentration by adjusting the amount of weak wash solution that is added to the dissolving tank. Additionally, Musow states that conductivity measurements are superior to indirect measurements such as TTA

measurements of the green liquor. By teaching that TTA measurements are inferior, Musow teaches away from the use of using TTA measurements of a green liquor for control purposes, and one of skill in the art would not be motivated to combine the TTA measurements of Musow with a control system such as the Baines system. Thus, one of ordinary skill in the art would not be motivated to combine Baines and Musow.

Second, there is no reasonable expectation that a combination of Baines and Musow would permit control of the causticization process. As discussed above, Baines teaches a control system that measures the individual components within both the green and white liquor to determine the amount of lime to add to the slaker. Baines further teaches that measuring a single component, such as sodium carbonate, may result in error. Musow, teaches measuring the concentration of sodium carbonate to determine the amount of weak white wash to feed into the dissolving tank. Thus, it is entirely uncertain whether the control system described in Baines could use the sodium carbonate concentration of the green liquor as disclosed in Musow to control the causticization process.

Third, even as combined the references do not disclose or suggest the invention. As stated above, none of the cited references disclose or suggest controlling the causticization process by adding weak white liquor to the green liquor. In contrast, Musow teaches adding weak white wash to the dissolving tank and both the '662 patent and Baines teach adding lime to the slaker. None of the cited references disclose or suggest a process that includes measuring the density and TTA of the green liquor to determine a desired density for the green liquor. None of the cited references disclose or suggest the step of calculating a set-value for the green liquor density based on the measured TTA of the green liquor, a target value for the TTA, and a model that correlates the measured TTA in the green liquor to green liquor density. Thus, the combination of Baines, Musow, and the '662 patent fail to disclose or suggest at least three elements recited in the claims. Accordingly, Claims 1-6, 8-12, 14, 15, and 26 are patentable over the cited references.

Applicant respectfully submits that the 35 U.S.C. 103 rejection has been overcome by Applicant's showing that there is no motivation to combine the cited references and that the references, even if combined, would not teach the invention as claimed. As the rejections have

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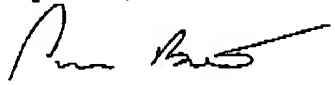
been overcome for at least the reasons set forth above, it is respectfully submitted that all pending are in condition for immediate allowance and an early notification of the allowability of these claims is earnestly solicited. If any matters remain to be resolved, the Examiner is urged to contact the undersigned attorney by telephone at 704-444-1185 to expedite prosecution of this application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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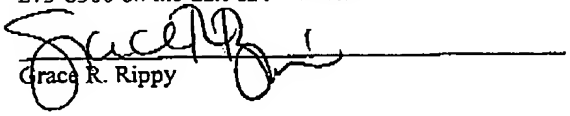

Grace R. Rippy

October 20, 2005
Date